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EXAMINER	
KIELIN, ERIK J	

ART UNIT	PAPER NUMBER
2813	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/296,835	WEIMER ET AL.	
	Examiner	Art Unit	
	Erik Kielin	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 October 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-5,8,10-12 and 41-47* is/are pending in the application.

4a) Of the above claim(s) *41,46 and 47* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-5,8,10-12 and 42-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

This action responds to the Amendments filed 22 September 2003 (Paper no. 41) and 9 October 2003 (Paper no. 43) and the Formal Drawings filed 22 September 2003 (Paper no. 40).

Drawings

1. The drawings were received on 22 September 2003. These drawings are acceptable.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 8, 2-5, 10-12, and 42-45 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Each of independent claims 8 and 42-45 were amended to include the limitation that the pressure in the RTA chamber during anneal is "in the range from about 1 milliTorr to less than atmospheric pressure." This is not supported by the specification. While it is acknowledged that Applicant has pointed out that the instant specification provides support for this limitation at p. 9, lines 2-5 (Amendment filed 22 September 2003, p. 6, third paragraph), this pressure range is not supported in scope with the specification. The specification indicates states at page 9, lines 2-5,

> "The optimal pressure in the chamber will vary depending on the particular RTP system and wet oxidation technique used. In general, the pressure can be at about atmospheric pressure, although if the H_2 and O_2 gases are combined in the chamber 50, then the pressure should be kept lower, for example, around 1 millitorr."

Atmospheric pressure is 760 Torr. One milliTorr is 1/760,000th of atmospheric pressure. There is no support for varying the pressure anywhere between, below 760 Torr down to 0.001 Torr (i.e. 1 milliTorr). There is no other discussion in the four corners of the instant disclosure to substantiate the presently claimed pressure range.

Further in this regard, MPEP 2163.05 (III) states,

> "With respect to changing numerical range limitations, the analysis must take into account which ranges one skilled in the art would consider inherently supported by the discussion in the original disclosure. In the decision in *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976), the ranges described in the original specification included a range of "25%-60%" and specific examples of "36%" and "50%." A corresponding new claim limitation to "at least 35%" did not meet the description requirement because the phrase "at least" had no upper limit and caused the claim to read literally on embodiments outside the "25% to 60%" range, however a limitation to "between 35% and 60%" did meet the description requirement. See also *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1328, 56 USPQ2d 1481, 1487 (Fed. Cir. 2000) ("the specification does not clearly disclose to the skilled artisan that the inventors * * * considered the [] ratio to be part of their invention * * *. There is therefore no force to Purdue's argument that the written description requirement was satisfied because the disclosure revealed a broad invention from which the [later-filed] claims carved out a patentable portion"). Compare *Union Oil of Cal. v. Atlantic Richfield Co.*, 208 F.3d 989, 997, 54 USPQ2d 1227, 1232-33 (Fed. Cir. 2000) (Description in terms of ranges of chemical properties which work in combination with ranges of other chemical properties to produce an automotive gasoline that reduces emissions was found to provide an adequate written description even though the exact chemical components of each combination were not disclosed and the specification did not disclose any distinct embodiments corresponding to any claim at issue. "[T]he Patent Act and this court's case law require only sufficient description to show one of skill in the...art that the inventor possessed the claimed invention at the time of filing.")"

The remaining claims are rejected for depending from the above rejected claims.

4. Claims 8, 2-5, 10-12, and 42-45 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Each of independent claims 8 and 42-45 were amended to include the limitation that the pressure in the RTA chamber during anneal is "in the range from about 1 milliTorr to less than atmospheric pressure." This is not supported by the specification for the reasons presented above.

The remaining claims are rejected for depending from the above rejected claims.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims **8**, 2-5, 10-12, and **45** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Patel** et al. (US 5,374,578) in view of either of **Emesh** et al. (US 5,728,603) and **Chivukula** et al. (US 6,066,581), and further in view of the excerpt from the basic textbook of **Van Zant**, (Microchip Fabrication, A Practical Guide to Semiconductor Processing, 3rd ed. McGraw-Hill: New York, 1997, pp. 157-160) and considered with the CRC Handbook of Chemistry and

Physics 63rd Edition, CRC Press: Boca Raton FL, pp. D-196 to D-197 (used for a showing of inherency only).

Regarding independent claims 8 and 45, **Patel** discloses a method of forming a semiconductor device comprising,

forming an oxygen deficient dielectric (called "ferroelectric") film **14** (Figs. 2-6) such as PZT which inherently has a dielectric constant of greater than 25 (see **Emesh** col. 8, Table 1 which teaches the dielectric constant of PZT, the same ferroelectric in **Patel**);

subjecting the dielectric film to an oxidation in "[g]ases like oxygen, ozone or air" (column 4, lines 10-11) using RTA (rapid thermal annealing), which must necessarily occur, then, in an RTA chamber at a temperature range of 650-850 °C for about 5-30 seconds (as further limited by instant claims 2-4) in order to increase the oxygen content of the ferroelectric film (column 2, lines 30-33), wherein any pressure may be used (col. 4, lines 24-27) during the annealing, which reads on pressures in the range from 0.001 Torr to less than 760 Torr (atmospheric pressure); and

performing a stabilizing treatment in a rapid thermal annealing chamber using oxygen anneal either before or after the ozone anneal (column 4, lines 23-29) --as further limited by instant claims 10 and 12.

Patel does not teach using wet oxidation to anneal the ferroelectric PZT layer **14**.

Emesh teaches forming an oxygen deficient ferroelectric material such as PZT; subjecting the dielectric film to a wet oxidation using a mixture comprising water and ozone in a rapid thermal annealing (RTA) chamber in order to reduce the temperature at which the ferroelectric material densifies/crystallizes and also to reduce the stress in the ferroelectric film

and improves its the electrical properties (column 5, lines 50-67) which also inherently increases the oxygen content of the film as indicated by the reduced leakage current (sentence bridging columns 3-4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate water during the ozone anneal of **Patel** for the reasons indicated in **Emesh** which includes at least reducing the stress in the ferroelectric film and improving the electrical properties such as increased dielectric constant (column 5, lines 50-67; col. 8, Table 1).

Similarly, **Chivukula** teaches forming an oxygen deficient ferroelectric material such as PZT; subjecting the dielectric film to a wet oxidation using a mixture comprising water and ozone at a temperature of 450-650 °C in a rapid thermal annealing (RTA) chamber for 30 seconds to several minutes to form uniform grain sizes in the ferroelectric material in a shorter time, at reduced temperature and superior characteristics during high frequency use compared to using dry oxidation (column 14, lines 27-48). (See also column 13, lines 30-53.)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate water during the ozone anneal of **Patel** for the reasons indicated in **Chivukula**, as noted, the amount of greater than 0.005 of steam relative to the other gases is inherently taught, as noted.

Furthermore, each of **Emesh** and **Chivukula** teaches that

> "Water vapour was conveniently introduced into the annealing atmosphere of the rapid thermal anneal (RTA) system during the annealing of the PZT by passing oxygen (O_2) through a double bubbler containing purified deionized water, so that the oxygen was saturated with water vapour, e.g. using a gas flow rate of about 2 L/min." (Emesh col. 5, lines 14-28; Chivukula, col. 13, lines 40-46).

It is held absent evidence to the contrary that the steam is present in an amount greater than about 0.005 (0.5%) relative to the other gases in the chamber. Support to show inherency can be easily determined from data in the Handbook of Chemistry and Physics. Pages D-196 and D-197 of the CRC (63rd edition) provide a Table having the vapor pressure of water as a function of temperature at temperatures below 100 °C. Because each of Emesh and Chivukula teaches that the oxygen is "saturated with water" all that need be known is the temperature of the bubbler. Even if it is assumed that bubbler is as low as standard room temperature (i.e. 25 °C), the CRC table of Vapor Pressure of Water Below 100 °C, indicates that the partial pressure of water is 23.756 Torr. Since atmospheric pressure is 760 Torr, the partial pressure of water in water-saturated oxygen is 23.756/760 ≈ 0.0313 or (3.13 %). Typically bubblers are heated indicating even high partial pressures of water. Accordingly, the water vapor is inherently greater than 0.005 relative to the other gases based upon the teachings in each of **Emesh** and **Chivukula**. (See MPEP 2112.)

Patel in view of either of **Emesh** and **Chivukula**, further, does not teach using a mixture of hydrogen and oxygen to provide the steam. Instead, each of **Emesh** and **Chivukula** use a bubbler (**Emesh** at col. 5, lines 57-59; **Chivukula** at col. 13, lines 40-46).

Van Zant teaches that "Dryox," a mixture of hydrogen and oxygen which react to form a steam oxidizing mixture in the reactor, is preferred over liquid systems such as a bubbler, because the process is cleaner and more controllable and also that "Dryox is the preferred method for production of advanced devices." (See pp. 157-160 -- especially page 160.)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use hydrogen and oxygen as taught by **Van Zant** to form the steam for the wet

oxidation mixture of either of **Emesh** and **Chivukula**, for the reasons indicated in **Van Zant**, as noted and especially because "Dryox" is preferred to bubblers which **Emesh** and **Chivukula** use.

Furthermore, it would be a matter of design choice as to which method of introducing the water to the oxidizing atmosphere of **Patel** in view of **Emesh** and **Chivukula**, because it appears that any known method of providing steam would work just as well and because there is no evidence of record to indicate that the mixture of hydrogen and oxygen would work better than other methods to achieve the wet oxidation. Rather, Applicant's specification teaches away from such unexpected results. Applicant teaches,

> "One of several techniques can be used to provide steam to a vicinity of the insulating film. Such techniques include using a **bubbled water vapor system**, a pyrogenic system or a catalytic system, or generating steam in the chamber *in situ*." (Emphasis added. See instant specification, page 3, lines 13-17.)

In other words, any of the presently notoriously well-known means to form the steam, which are specifically used in the art for oxidation, could be used, according to Applicant. Also note that the paragraph bridging pages 7 and 8 of Applicant's specification indicates specifically that a bubbler can be used in the instant invention.

Then further regarding claim 8, and additionally regarding claim 5, the ratio of hydrogen to oxygen is not taught in **Patel**.

However, each of **Emesh** and **Chivukula** indicate that the wet oxidation is carried out in water plus oxygen and ozone (**Emesh** at col. 5, lines 19-28; **Chivukula** at col. 13, lines 36-46). "[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." *In re Preda*, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA

1968) See also *In re Lamberti*, 545 F.2d 747, 750, 192 USPQ 278, 280 (CCPA 1976). With this in mind, because each of **Emesh** and **Chivukula** teach that oxygen must be in excess of the water vapor, one of ordinary skill would know, based upon the stoichiometry of the reaction between hydrogen and oxygen to form the "Dryox" mixture containing water (as taught by **Van Zant**) that the ratio of hydrogen to oxygen must necessarily be less than or equal to about 0.67 because hydrogen reacts with oxygen in a 2 to 1 stoichiometric ratio ($2\ H_2 + O_2 \rightarrow 2\ H_2O$) Otherwise, the oxygen will be depleted in the formation of water and excess hydrogen would remain, contrary to the teaching in each of **Emesh** and **Chivukula**. Accordingly, one of ordinary skill would clearly recognize that using the more desirable method of "Dryox" oxidation, as taught by **Van Zant**, would necessarily require a range hydrogen to oxygen of 0.67 or less in order to achieve the mixture taught by each of **Emesh** and **Chivukula** which requires excess oxygen with the water, which overlaps the claimed ratio of 0.1 to 0.8 (instant claim 8) and 0.1 to 0.5 (instant claim 5).

Further regarding claims 2-4, although **Patel** does not recite Applicant's exact ranges of either 450-750 °C or 750-900 °C or exact times of 20-60 seconds for the oxidation, **Patel** does disclose an overlapping temperature range of 650-850 °C and time range of 5-30 seconds, in at least one example. **Emesh** teaches 300 seconds, which is a function of the lower temperatures used. **Chivukula** teaches 30 seconds to several minutes, which are, again, temperature and material dependent. These claims are *prima facie* obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the temperature and anneal time to provide the best ferroelectric film, according to the precedent above and the teachings in Emesh and Chivukula that the temperatures and times are material dependent. Also note, although **Emesh** teaches an ozone/water oxidizing temperature of 500 °C or less, **Emesh** also teaches that increasing the temperature at which the wet oxidation occurs increases the dielectric constant of the high dielectric constant film (column 8, lines 6-12) which is desired in the semiconductor device fabrication art especially for fabricating capacitors for DRAM devices. Accordingly, one of ordinary skill would be motivated to use higher temperatures than 500 °C, as suggested by **Emesh** to increase the dielectric constant of the ferroelectric layer to enable smaller capacitors to be formed, which in turn enables further miniaturization of semiconductor devices using capacitors.

Regarding claim 11, **Patel** does not teach performing the ozone oxidizing or the oxygen stabilizing treatments at different temperatures, but each of **Emesh** and **Chivukula** teaches that the addition of water vapor reduces the densification/crystallization temperature from dry conditions.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the wet ozone anneal of **Patel** in view of **Emesh** and **Chivukula** at a lower temperature than the oxygen stabilizing anneal, because each of **Emesh** and **Chivukula** teaches a lower temperature may be used for wet versus dry oxidation, and provides examples of temperatures lower than in **Patel**.

7. Claim **42** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Patel** et al. (US 5,374,578) in view of either of **Emesh** et al. (US 5,728,603) and **Chivukula** et al. (US 6,066,581) and further in view of US 5,840,368 (**Ohmi**) and considered with the CRC Handbook of Chemistry and Physics 63rd Edition, CRC Press: Boca Raton FL, pp. D-196 to D-197 (used for a showing of inherency only).

The prior art of **Patel** in view of either of **Emesh** and **Chivukula** and the inherent showing from the CRC Handbook, as explained above, discloses each of the claimed features except for indicating that the steam is provided by a catalytic system.

Ohmi teaches a catalytic system for providing steam for wet oxidation. (paragraph bridging cols. 2-3 and col. 4, lines 40-45). **Ohmi** teaches that the catalytic oxidation beneficially reduces the temperature at which an oxidation may occur and provides a cleaner way of providing water (Abstract).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the catalytic method of forming steam, taught by **Ohmi**, for the wet oxidation of **Patel** in view of either of **Emesh** and **Chivukula**, for the beneficial reasons just indicated and further because, as noted above, Applicant has not indicated that there exist anything critical to the method by which the water is formed, moreover teaching away from any criticality to such method of steam production.

8. Claim **43** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Patel** et al. (US 5,374,578) in view of the excerpt from **Ghandi**, VLSI Fabrication Principles, 2nd ed. John Wiley & Sons: New York, 1994, pp. 465-466, and either of **Emesh** et al. (US 5,728,603) and

Chivukula et al. (US 6,066,581) and considered with the CRC Handbook of Chemistry and Physics 63rd Edition, CRC Press: Boca Raton FL, pp. D-196 to D-197 (used for a showing of inherency only).

The prior art of **Patel** in view of either of **Emesh** and **Chivukula** and the inherent showing from the CRC Handbook, as explained above, discloses each of the claimed features except for indicating that the steam is provided by a pyrogenic system.

Ghandi teaches the benefits of using a pyrogenic system formation of steam for oxidation indicating that the method is better than a bubbler and provides better control over the partial pressure of the water and is "well suited for the manufacturing environment." (See paragraph bridging pp. 465-466.)

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the pyrogenic method of forming steam, taught by **Ghandi**, for the wet oxidation of **Patel** in view of either of **Emesh** and **Chivukula**, for the beneficial reasons just indicated and further because, as noted above, Applicant has not indicated that there exist anything critical to the method by which the water is formed, moreover teaching away from any criticality to such method of steam production.

9. Claim **44** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Patel** et al. (US 5,374,578) in view of either of **Emesh** et al. (US 5,728,603) and **Chivukula** et al. (US 6,066,581) and considered with the CRC Handbook of Chemistry and Physics 63rd Edition, CRC Press: Boca Raton FL, pp. D-196 to D-197 (used for a showing of inherency only).

The prior art of **Patel** in view of either of **Emesh** and **Chivukula** and the inherent showing from the CRC Handbook, as explained above, discloses each of the claimed features of claim 44. Additionally both **Emesh** and **Chivukula** teach that water is provided by a bubbler system (**Emesh** at col. 5, lines 57-59; **Chivukula** at col. 13, lines 40-46).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to also use the bubbler for the wet oxidation, already indicated as obvious over either of **Emesh** and **Chivukula**, for the oxidation of **Patel**, because this is the manner in which **Emesh** and **Chivukula** provide water vapor and since one of ordinary skill would be motivated to use water vapor, for the reasons indicated earlier, one of ordinary skill would be especially motivated to use the system taught in **Emesh** and **Chivukula** to provide the water vapor.

Response to Arguments

10. Applicant's arguments filed 22 September 2003 (Paper No. 41) have been fully considered but they are not persuasive.

In the paragraph bridging pp. 6 to 7 Applicant argued that the cited art does not teach the claimed invention. Initially it is noted, as per the rejection of all claims under 35 USC 112(1) as lacking enablement and as having new matter, that the instant application fails to meet the written description requirement for the claims. Assuming, *arguendo*, that Applicant did enable the claims as presently drafted, the applied art still teaches or suggests each of the presently claimed features, as presently drafted, as noted above in the rejection of the claims.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "a single wet

oxidation anneal process" [emphasis in original]) are not recited in the rejected claim(s). Nor does Applicant have support in the specification for a "single" wet oxidation anneal. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicant appears to argue (on p. 7, first full paragraph) that "three" (emphasis in original) references are too many references. First, reliance on a large number of references in a rejection does not, without more, weigh against the obviousness of the claimed invention. See *In re Gorman*, 933 F.2d 982, 18 USPQ2d 1885 (Fed. Cir. 1991). Second, it is pertinent to note that one of the three references about which Applicant complains is a basic textbook (the Van Zant reference) which is knowledge notoriously well known to one of ordinary skill. Accordingly, the rejection is really only over 2 references. Third, it is noted that Applicant never addresses the Van Zant reference in the arguments except to suggest that Van Zant fails to remedy alleged deficiencies in the applied art of Patel in view of either of Emesh and Chivukula.

In the same paragraph Applicant argues that the references are not properly combinable and provides arguments in support of this on pages 7 through 9 which are addressed herein below.

First Applicant addressed the single wet oxidation process. Examiner respectfully disagrees. Patel in view of either of Emesh and Chivukula teaches a single wet oxidation process. Note that the claim language does not limit the presence of further wet oxidation anneals. Moreover, the instant specification makes no mention of, nor provides support for, **only** a single wet oxidation anneal, even though that limitation is not presently claimed. Finally, given the teaching of Emesh and Chivukula, **only** a single wet oxidation process is suggested by each of

Emesh and Chivukula, even though it is not presently claimed to every extent disclosed in the instant specification.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the suggestion to combine the references is very clearly provided in the above rejection of the claims above, which are incorporated herein in their entirety.

It is noted that Applicant's arguments do not consider the applied references as a whole. Simply because of the use of terms like "longer" and "shorter" are used, Applicant fails to address the actual times indicated in Patel and each of Emesh and Chivukula.

Applicant's arguments regarding the temperatures sued in the references are also not convincing because Applicant has stated in the instant specification that any temperature above 450 °C will work. Accordingly, the temperature used is a matter of routine optimization in the absence of evidence of unexpected results. Moreover, the rejection of the claims very clearly points out specific motivation to use the differently claimed temperatures ranges.

Applicant argues that Patel is not concerned with "stress" in the ferroelectric films simply because Patel does not mention this. This is irrelevant because one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of

references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that because Patel uses up to six anneals to reduce stress in the ferroelectric film that one of ordinary skill would have no reason to use the wet anneal of Emesh and Chivukula. Examiner respectfully disagrees. Each of Emesh and Chivukula teach the benefits of reducing the stress by using a wet oxidizing anneal of the ferroelectric films. Their process requires only a single wet anneal. Accordingly, one of ordinary skill has the expressed suggestion to use the wet oxidizing anneal to reduce the stress in the ferroelectric films of Patel using a simpler process.

Applicant argues that Patel allegedly teaches a shorter annealing time (30 seconds) than Emesh (300 seconds), while Emesh teaches that the steam anneal reduce the required anneal time. But Patel clearly teaches that the annealing of the PZT layer may be a single anneal or a plurality of anneals and teaches anneal times up to an hour (Patel, col. 4, lines 55-66). Accordingly, Applicant fails to consider the entire Patel reference.

Applicant argues that the reference of Patel teaches away from either of Emesh and Chivukula. Examiner respectfully disagrees. Exemplary times and temperatures are not indicative of a teaching away, especially since each of Emesh and Chivukula teach that the times and temperatures are dependent upon the ferroelectric material being annealed. One of ordinary skill would know every well to optimize the temperature and anneal times to get the best quality ferroelectric film. Moreover, Applicant wholly fails to claim any specific material thereby suggesting that Applicant's temperatures and times are also material dependent and not critical, as presently claimed, as one of ordinary skill would very clearly know. Applicant still fails to

provide any evidence whatsoever for unexpected results for any of the laundry list of pressures, temperatures, concentrations of water, hydrogen, oxygen, etcetera.

The remaining arguments presented by Applicant on pages 10-12 addressing claims 42-44 are noted provide no new argument not already addressed herein above.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik Kielin whose telephone number is 703-306-5980. The examiner can normally be reached on 9:00 - 19:30 on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached at 703-308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Erik Kielin
Primary Examiner
December 20, 2003